AUSTRALIAN INDUSTRY GROUP

A SUPPLY CHAIN BASED APPROACH TO CARBON ABATEMENT: CASE STUDY I – SPC PEACHES

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SPC ARDMONA

Sustainability victoria

State Government Victoria

introduction

The Australian Government has clearly signaled its intention to address climate change by setting targets to reduce Australia's greenhouse gas emissions. This will create a carbon constrained economy with implications for businesses and the supply chains they operate within.

The ResourceSmart Business Industry Pilot (the 'Pilot') delivered by the Australian Industry Group (Ai Group) in conjunction with Sustainability Victoria (SV) trialled an innovative approach using life cycle thinking to support Victorian industry to prepare for a carbon constrained economy by working with key companies across the supply chains for two iconic products.

Two products were selected for the study, both of which are produced in Victoria:

- 410 gram can of SPC peaches in natural juice produced by SPC Ardmona (SPCA); and
- Two litre tub of Creamy Classics vanilla ice cream produced by Bulla Dairy foods (Bulla).

This case study details the results of the 410 gram can of SPC peaches in natural juice product.

the product and the supply chain

Preserving peaches is a great way of making Summer last into Winter! The peach harvest in northern Victoria starts in late January and continues until late March. Picked peaches deteriorate rapidly after harvest even in cold storage, thus the need for some form of preservation for eating out of season, and hence the time honoured tradition of peach canning, carried out at SPCA's Shepparton factory since the 1920s.

The 410 gram can of sliced SPC peaches in natural juice uses premium quality peaches. The product includes peach slices (57% min) and refined fruit (pear/apple) juice. There are no artificial colours, flavours or preservatives. The filled cans are supplied to retailers in cartons of twelve.

The peach product was chosen as peach fruit throughput represents a significant proportion of site production. The manufacturing process also involves a number of key unit processes including those associated with natural juice manufacture.

Key contributions to the footprint and primary supply chain participants are listed in the following table. The production process is represented in Figure 1.

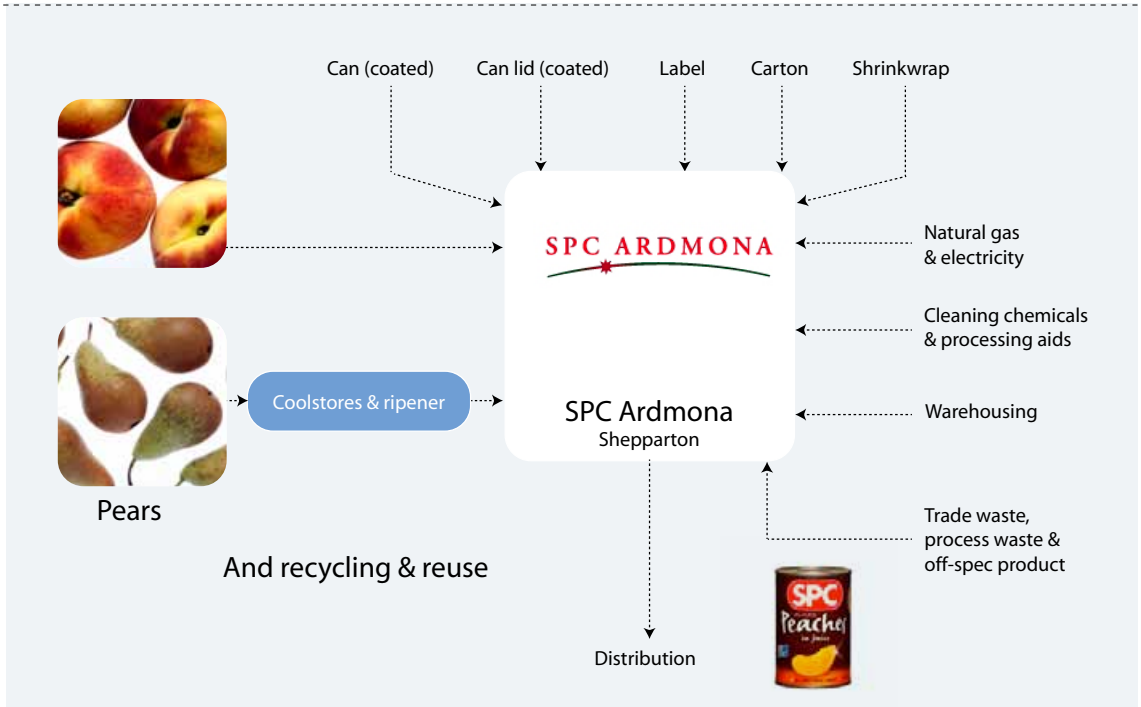
Table 1

SPC peach can: key contributions to the footprint and primary supply chain participants

Input	Description	Primary participant/s
Peaches	Primary ingredient	Growers in northern Victoria
Juicing pears	Primary ingredient used in natural juice	Growers in northern Victoria
Steel can	Imported rolls of tin coated steel are processed locally. Processing includes application of an internal coating and welding of the can using copper wire	Can manufacturer
Label	Label is manufactured locally	Label manufacturer
Carton	Brown corrugated cardboard carton manufactured locally using recycled pulp	Carton manufacturer
Fruit storage, processing and canning	Processes include: - Cold storage of received fruit prior to processing - Peach processing - Juice manufacturer - Canning	SPC Ardmona (including third party cold storage)

FIgure 1

SPC peach can: suppy chain



methodology

The Pilot applied life cycle assessment (LCA) techniques to determine the carbon footprint associated with the production and distribution of the product. The results of this Pilot enabled the identification of 'carbon hot spots' across the supply chain and investigation of abatement opportunities.

Key project steps included:

- Carbon footprint studies (LCAs);
- Site assessments aimed at carbon hot spots in the supply chain; and
- Workshops with representatives from the supply chain to identify carbon abatement opportunities.

LCA results

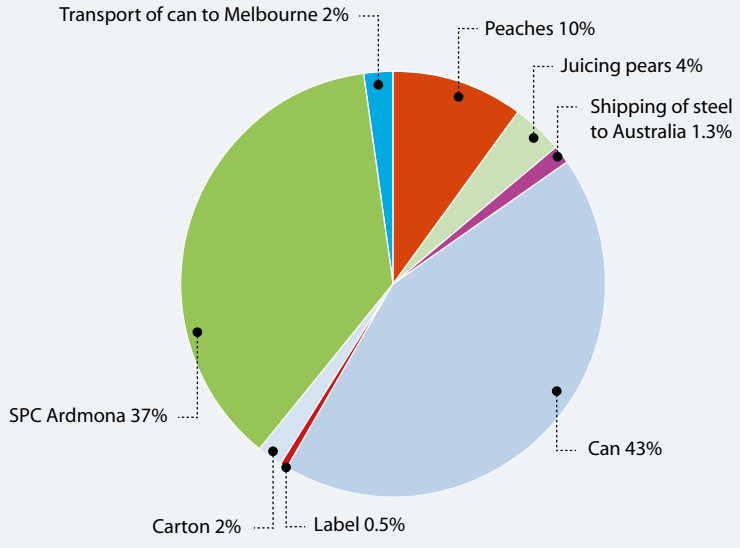
The streamlined LCA estimated that the carbon hot spots were associated with the steel can and processing at SPCA. This was confirmed by the detailed study that found the following major contributions:

- Steel can (43%) – primary steel use;
- SPCA (37%) – primarily energy use; and
- Fruit growing (14%) – mainly electricity use and fuel consumption.

The total carbon footprint estimated from the streamlined LCA was similar to that calculated in the detailed study.

Figure 2

Contributions to the carbon footprint of a can of SPC peaches delivered to a retail store in Melbourne



Note: The SPC Ardmona contribution includes use of third party cold storage which can vary each season.

Subsequent emission reduction investigations focused on the carbon hot spots, namely the steel can and SPCA's Shepparton plant.

design modifications – steel can

Analysis of the individual contributions to the steel can footprint aided identification and prioritisation of abatement opportunities. Coils of tin plated steel sheet are currently imported and processed locally, as this material is no longer produced in Australia. The diagram below demonstrates that the majority of the footprint is associated with this imported steel.

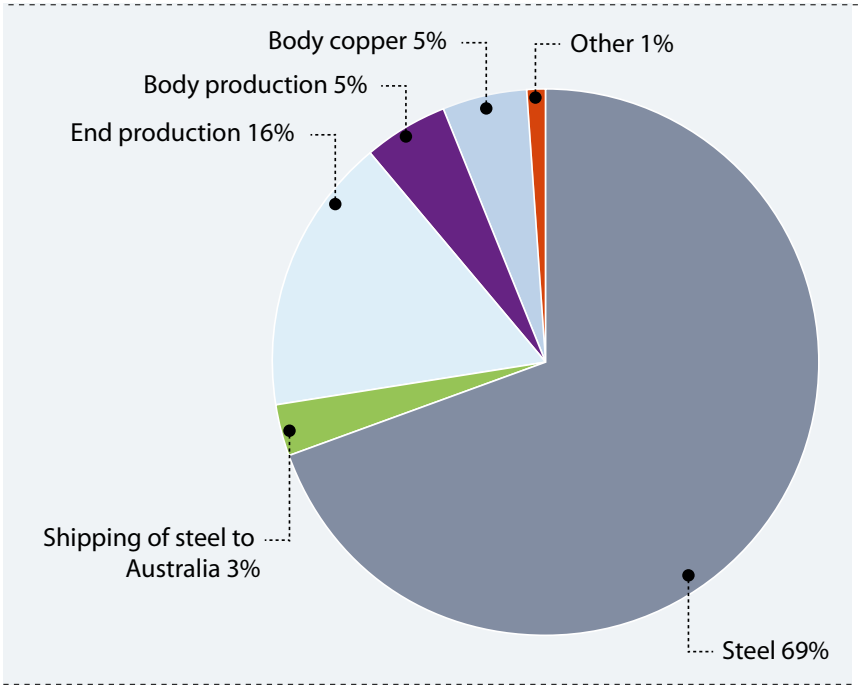


Figure 3

Contributions to the carbon footprint of the steel can

The LCA data suggest that use of an alternative material such as plastic may provide an opportunity for substantial carbon reduction; however, the material would need to offer similar performance to the steel can. The relative merit of changing the material would require comparative analysis of the carbon footprint of the available packaging options. Key issues that would need to be considered as part of this analysis would include:

- Carbon footprint of the materials;
- Relative energy efficiency of the cooking processes at SPCA;
- Container manufacturing and transport processes; and
- Recyclability.

Participants at the workshop also used the LCA information to identify a range of potential opportunities to reduce the can footprint including design modifications, sourcing of lower carbon steel and energy efficiency in the Australian plants.

Cans were manufactured at the Shepparton plant during the early years of production though this has since been handed to a specialist packaging company. The can forming process currently occurs in two stages:

1. Imported steel sheet is cut into rectangular sheets and round can ends at a plant in Melbourne; and
2. The rectangular sheets are formed and welded into a can shape at a factory close to SPCA's Shepparton process.

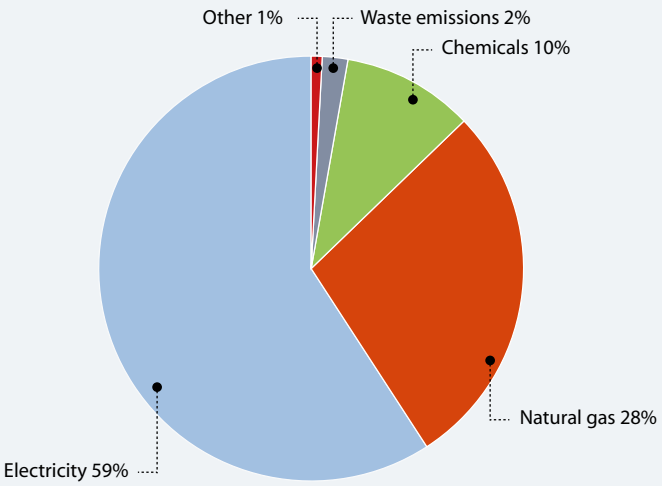
This enables substantial cost savings by eliminating the need to transport empty cans from Melbourne and saves transport related carbon emissions in the process.

energy efficiency audit - SPC Ardmona

The contribution to the carbon footprint from SPCA derives from fruit cold storage, processing and canning at the Shepparton plant. The contributions are energy use (87%), chemical use (10%), emissions from breakdown of waste (2%) and other (1%).

Figure 4

Contributions to the carbon footprint at SPCA



The study determined the actual energy use specific to the peach can manufacturing process. The seasonal nature of production, the large number of processes occurring simultaneously on-site at SPCA and the limited available energy sub-metering significantly increased the complexity of the study.

The following figure highlights the key energy consuming processes and the related carbon emissions. Figure 5 also demonstrates the greater carbon emission intensity for electricity in comparison to natural gas for a given level of energy.

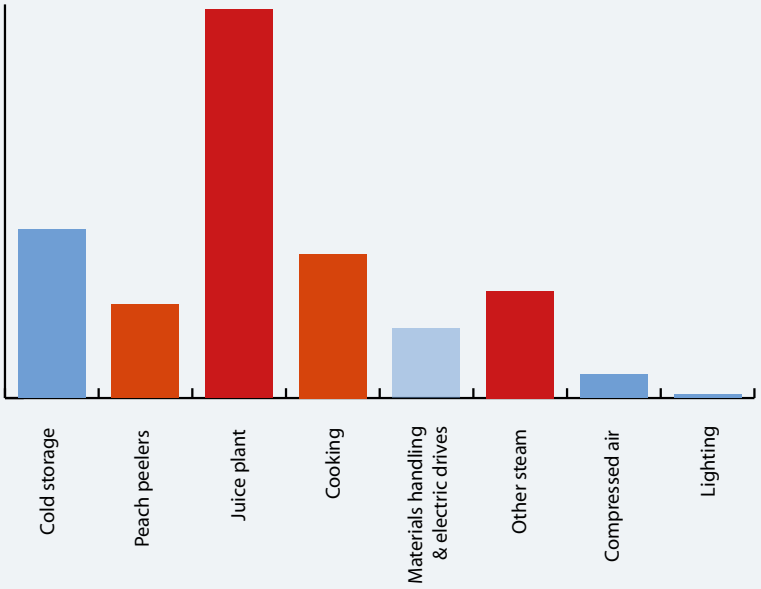
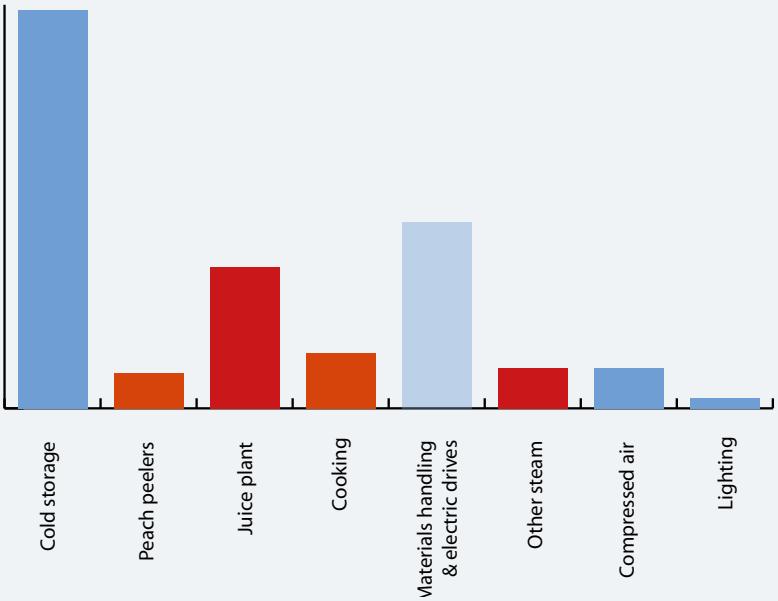


Figure 5

Energy source contributions to the carbon footprint associated with the peach can at SPCA

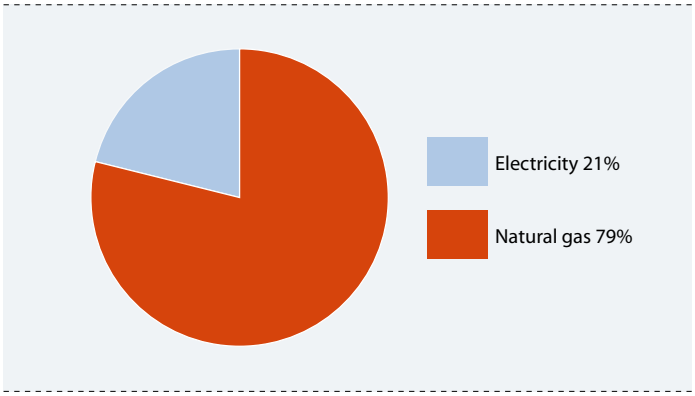


Process contributions to the energy footprint

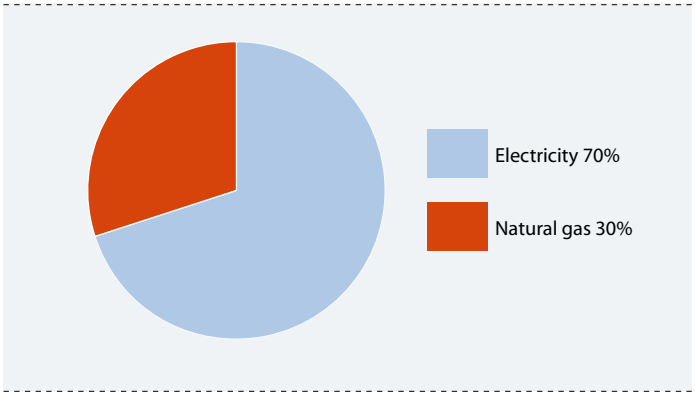
Process contributions to the carbon footprint

For SPCA these results were unexpected. "Aspects of our operations that we thought would account for a high or low proportion of our energy use actually ended up at the opposite end of the spectrum. Without conducting the study, I have no doubt we would have targeted projects in areas with less potential for both environmental and financial return."

Vince Pinneri Managing Director, SPC Ardmona



Source contributions to the energy footprint



Energy source contributions to the carbon footprint

The audit recommended actions for on-site energy management that included:

- Energy efficiency improvement works;
- Optimised energy management system;
- Process modifications; and
- Alternative energy generation options.

SPCA can now focus operational and capital programs on the major areas of energy usage and carbon emissions. The results have helped to support implementation of a capital project to improve steam condensate recovery and have provided an increased focus on juice plant processes to generate savings.

Successful implementation of these opportunities with a payback of five years or less would yield a 6% reduction in the overall product footprint.

> "By selecting one product rather than our entire operation, we were able to focus on getting the methodology right, and it provided a much higher degree of confidence in the end results. Now that we understand what is involved and how to do it, we can apply the same methodology across other production processes. We will be seeking collaborative projects that impact across the entire supply chain. We're looking at new solutions that impact on multiple stakeholders, potentially involving new fruit varieties or packaging formats."
>
> Vince Pinneri, Managing Director, SPC Ardmona

supply chain roadmap

Opportunities that arise from supply chain co-operation are listed in Table 2 below.

The supply chain roadmap is intended to be used as a communication and collaboration tool among supply chain participants and to form the basis of on-going monitoring.

Table 2

SPC peach can supply chain roadmap

Sector	Carbon reduction opportunities across the supply chain
Peaches	Work with water suppliers and SPCA to: - Identify measures to reduce carbon emissions from irrigation
Juicing pears	Work with SPCA to: - Energy recovery from burning 'end of life' orchards with SPCA peach stones
Steel can	Work with steel industry to: - Identify sources of lower carbon steel Work with copper wire supplier to: - Identify sources of lower carbon copper Work with steel and waste sector to: - Increase steel, copper and tin recycling rate Work with welding technology supplier to: - Investigate alternative welding that does not include copper
Label	Work with paper supplier to: - Identify sources of lower carbon paper
Carton	Work with SPCA and retailers to: - Investigate use of re-useable transport and display cartons - Ascertain impact of changing from unbleached to shelf ready bleached cartons
SPC Ardmona & cold storage	Work with growers to: - Manage fruit varieties to reduce seasonal peak supply into SPCA - Review options for reducing water irrigation pre-harvest - Reduce temperature of fruit received at SPCA - Reduce factory rejection rate through supply of higher quality fruit - Sequester carbon emissions on farm Work with can manufacturer to: - Reduce steel weight per can - Investigate alternative lower carbon packaging materials - Use non-coated can end or alternative low energy coatings - Consider development of reusable container Work with third party cold storage providers to: - Improve efficiency of cold storage - Review pear handling through cold storage Work with water supplier to: - Optimise energy recovery from biogas - Minimise discharges to trade waste Work with processing technology providers to: - Review lower carbon processing options for juice, peaches and cooking Work with energy service providers to: - Implement alternative energy generation projects
Transport to Melbourne	Work with transport providers to: - Improve efficiency of product transport

key insights associated with this supply chain

- Carbon emissions for the peach can are driven primarily from material use and manufacturing;
- SPCA's direct emissions account for around one third of the product footprint. On-site abatement at SPCA may well have a significant and cost effective impact on the product footprint. However, significant opportunities for footprint reduction may also be realised through collaboration with the supply chain;
- Each energy source has a different carbon impact. For instance, heating processes using natural gas emit less carbon than a similar process that uses grid electricity;
- A greater insight into site energy use can improve targeting of company resources;
- Recycling of materials can assist with carbon footprint reduction; and
- Transport represents a minor contribution to the total supply chain emissions.

overall benefits

- The Pilot helped develop a shared understanding of carbon issues between supply chain participants;
- The LCA results and identified opportunities can be drawn upon by supply chain members on an ongoing basis (e.g. during current and future commercial negotiations);
- The results aid identification of business opportunities and risks associated with carbon management and the impact of any price on carbon emissions across the supply chain;
- Participants advised that the carbon footprint results were easily understood and provided ongoing value. This promotes broad internal engagement within participating organisations and enables incorporation of learnings into company sustainability strategies;
- The methodology was able to promote supply chain engagement. Participants worked together to identify and prioritise a broad range of carbon abatement opportunities including supply chain efficiencies and product design changes; and
- The Pilot methodology can be easily applied to other products and services.

acknowledgements

The Australian Industry Group and Sustainability Victoria would like to thank all of the participating companies, primary producers, government agencies and stakeholders for their time and effort in contributing to the success of the Pilot.

further information

Further information about this case study please contact:
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